

- FIG. 10. Terminal portion of the nervous system of the abdomen.
a, b, c, d. nerve-trunks of the terminal ganglion.
ad. adipose tissue.
con. connective.
ej. d. ejaculatory duct.
G7, G8. seventh and eighth abdominal ganglia.
h. int. hind intestine.
in. n. intestinal nerve.
l. lateral nerve-trunk.
m. n. median nerve.
m_s. bundle of muscles in the eighth abdominal segment.
op. opening to the tracheal gills.
s. v. seminal vesicle.
tr. trachea.
tr. n. tracheal nerve.
tv. n. transverse nerve.
v. ventral nerve-trunk.
v. d. vas deferens.

A CASE OF GREGARIOUS SLEEPING HABITS AMONG ACULEATE HYMENOPTERA.

By J. CHESTER BRADLEY.

Mr. Banks* has summarized what was recorded up to the time he wrote concerning the sleeping habits of Hymenoptera. Briefly, this consisted of several observations of usually solitary aculeates either sleeping in flowers or clinging to twigs. Belfrage has observed *Scolia lecontei* "during the night and chilly weather in clusters, closely attached to the stems of grass and plants."

Mr. Banks' observations were made in a small patch of timothy, orchard grass and wild onion. Here he found specimens of three species of *Ammophila*, of two bees, and of *Myzine sexcincta* sleeping, but always only *one* individual on the same stem of grass. Night after night they would appear between seven and eight, and leave before five the next morning. Gradually they became less numerous. Near the patch was a field of recently cut rye, where he surmises they may previously have rested, and also a garden and bean patch.

Mr. Schwarz† records observing in southwestern Texas within a short space, four dead shrubs of *Celtis pallida* which harbored from fifty to seventy specimens of two species of bees asleep, and near at hand other shrubs with a smaller number of specimens.

* Journ. N. Y. Ent. Soc. Vol. X, p. 209.

† Proc. Entom. Soc. Wash., IV, p. 24.

Always in company with the bees was a Sphegid (Coloptera wrightii) which at the time of his observations, seven-thirty on cloudy mornings, was walking slowly up and down the twigs over the bodies of the sleeping bees.

Mr. Brues‡ records several very interesting additional observations. Along the shore of Lake Michigan he found one evening both sexes of *Priononyx atrata* sleeping in large numbers on the thicker parts of a plant of sweet clover. In McHenry County, Ill., also on sweet clover he and Mr. Melander noticed the following species commingled in sleep: *Scolia bicincta*, *Nysson plagiat*; *Tachytes* sp., and some other smaller forms. *Epeolus* was predominating. He has frequently observed males of *Scolia lecontei* resting on an umbelliferous plant in Texas. In southern Illinois he noticed males of *Myzine sexcincta* in abundance sleeping on a small dried plant. Mr. Brues further questions why certain plants are regularly chosen by certain species. In some cases, as that of *Priononyx atrata* it may have been odor, although the species does not frequent sweet clover much during the day. *Scolia lecontei* he shows is afforded a certain concealment by harmonizing, in the head downward position which they assume, with the plants, although they would be much more perfectly concealed on certain bright flowers which they leave alone.

On the second of June last summer I was driving in the Mt. Diablo Range along the Arroya de los Gatos near where it opens out into the extremely hot and dry Kettleman plains in the southwestern part of the San Joaquin Valley in Fresno County, California, when slightly before dusk my attention was called to a bunch of dark objects attached to a dried stem of wild oats. Upon observation they proved to be black wasps asleep, (*Priononyx atrata*). Looking farther I observed another and still another such group, and within the next hour, or until it became too dark to see them, I observed scores, almost hundreds of these bunches of resting wasps, sometimes on wild oats, sometimes on other plants. Each group contained from one or two to a couple of dozen individuals, and I was often able to break them off and place them in a jar before they became considerably aroused. In all I captured 490 odd individuals before total dark, about an hour's time.

‡ Journ. N. Y. Ent. Soc., XI, p. 228.

No less than seven species of aculeate Hymenoptera were represented in large numbers, belonging to three different families, four sub-families and five genera, and each species so far as observed was always grouped separately. Though a group of one species were in close juxtaposition to that of another on a neighboring stem there was no intermingling of individuals.

Returning on a subsequent evening a week later (but perhaps not finding precisely the same place at a favorable time), I found the bunches of wasps less abundant, but still present, and found a few groups of an eighth species.

The species found on the first night were Chlorion (*Priononyx*) *atratum*; *C. (Priononyx) bivefoleatum*; two species of *Sphex* (formerly *Ammophila*-synonym of *Sphex*); *Monedula emarginata*; *Steniola duplicata*, and *Stizus unieinctus*, the last two being especially common. On the second visit the above were found, and one additional species, *Sphecius fervidus* Cr. On both occasions, there were a few individuals of one or two other species, notably bees, *Bombus*, sp., *Halictus farinosus* and *Melissodes agilis*, etc.

I am indebted to Prof. Fernald for the identification of the Sphegidae and to Mr. H. L. Viereck for that of the others, excepting *Sphecius fervidus*, which is my own determination.

The vegetation in that part of the San Joaquin Valley had already for over a month been scorched dry and brown by the intense sun-heat and absence of rain. Along one side of the road in the canon the vegetation had been freshly burned off by extensive prairie fires. Along the other side was a field of recently cut grain with a narrow standing strip along the road in which were situated the groups of wasps, not only on the oats, but on one or two other dried plants. We found them at intervals for perhaps a mile or more and then it became too dark to see further. Not everywhere along the road were the conditions as above described, in some cases the bunches occurring in a tangled growth of dried weeds.

On subsequent evenings I hunted in vain for sleeping wasps in the sage brush and fox-tail grass on the plains, twelve miles distant. No trace of the wasps was to be found.

The fact that the "hostelry" described by Mr. Banks was also bordered by a field of recently cut grain may not be a mere coincidence. It is quite possible that normally these wasps are scattered through such fields when sleeping at night, and that by the

cutting of the grain are driven into the outlying standing patches. There certainly was no protection received from their gregarious sleeping, since the groups of wasps were very conspicuous objects in the failing light.

Perhaps it would require considerable knowledge of wasp psychology, to be able to answer, first, why they congregate at all, instead of each sleeping on whatever stem of oats happens to be convenient, and second, why when thus congregating they ignore the similarly situated groups of other, even close related species, and choose only those of their own fellows. The wide range of the species implicated would seem to indicate that the habit is either a fundamental one, or else a general response to some peculiar environmental condition.

Entomological Laboratory, The University of California, August 1, 1907.

NOTES ON THE LIFE HISTORY OF THE LEAFY DIMORPH OF THE BOX-ELDER APHID, *CHAITOPHORUS NEGUN-* *DINIS THOS*.*

By J. J. DAVIS, OFFICE OF THE STATE ENTOMOLOGIST, URBANA, ILL.

My attention was first called to this curious dimorph by Mr. J. T. Monell, who found it at St. Louis, June 21, 1907, and had received it from Oestlund as early as 1889.

The life history of the dimorph I have found to be essentially like that of the dimorph of the European *C. testudinatus* Thorn., as described by Kessler.

In central Illinois the viviparous females begin to produce the dimorphs about June 1, and the latter, after crawling over the leaves for a short time, attach themselves to the veins of either surface of the leaf. There they remain in a dormant condition for two or three months. By the last of June or the first of July the parent females begin to disappear, and soon only stragglers can be found. In the latter part of August the dimorphs revive, molt several times, and become viviparous females. Subsequent generations are oviparous, and lay the eggs which are to carry the species over the winter.

The dimorphs are inconspicuous; they appear as minute flat scales lying close against the leaf, and having the same green color as the leaf.